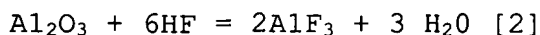
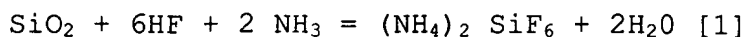


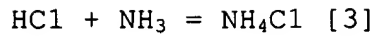
REMARKS

The Official Action and the maintained and newly cited references have been carefully reviewed. The review indicates that the claims, especially as amended, recite patentable subject matter and should be allowed. Reconsideration and allowance are therefore respectfully requested.

In advance of contending with the grounds on which the rejections have been made, a brief overview of the improved integrated metal etch tool for removing post-RIE polymer rails from Al/Cu metal lines of a semiconductor structure will be provided to establish better distinction between the integrated metal etch tool containing vacuum and deionized water rinse chamber means or strip, vacuum and deionized water rinse chamber means of the invention, compared to the apparatus disclosed in the cited references.

In the art of making semiconductor structures in which there must be removal of post-RIE polymer rails that are formed on a Al/Cu metal line, applicants are the first to invent an integrated metal etch tool interfaceable with vacuum and deionized water rinse chamber means or strip, vacuum and deionized water rinse chamber means that permits removing sidewall polymer rails left behind after the metal (Al/Cu) RIE process. The novel strip, vacuum, and deionized water rinse chamber means interfaced with the metal etch tool performs the chemical reactions of:





(either post resist strip or prior to resist strip), to allow the products from both etching and neutralization reaction to be soluble in deionized water.

Claims 13-17 were rejected as being anticipated by Kawasaki et al. under 35 USC 102(b).

Applicants respectfully traverse the rejection and request reconsideration for the reasons which follow.

Kawasaki et al. disclose a method of removing residual corrosive compounds by plasma etching and washing. The apparatus therefor, as disclosed in col. 3 lines 22-44 comprises eight parts - however, the apparatus lacks a metal etch tool interfaceable with strip chamber means, vacuum chamber means and deionized water rinse chamber means.

Withdrawal of the rejection is respectfully requested.

Claims 13-15 were rejected as being anticipated by Okutani under 35 U.S.C 102(b).

Applicants respectfully traverse this rejection and request reconsideration for the following reasons:

A review of Okutani shows that it is directed to a method of and apparatus for producing semiconductor devices. The various apparatuses for producing the semiconductor devices incorporates a dry processing mechanism and a wet processing mechanism for the wafers, and a carriage mechanism is used to reduce the space for the apparatus for dry-processing and wet-processing. No where in Okutani is there any reference to or mention of, the need for functions to remove the products of

etching and products from neutralization of the etchings to prevent the sidewalls from trapping chlorine and water species. It is therefore not surprising that Okutani's apparatus lacks an integrated metal etch tool interfaceable with strip, vacuum and deionized water rinse chamber means to remove the etchant reaction products and the neutralization of those etchant products, both of which are soluble, in a deionized water rinse chamber.

Withdrawal of the rejection is respectfully requested.

Claims 13-15 were rejected as being anticipated by Toshima under 35 U.S.C. 102(e).

Applicants respectfully traverse this rejection and request reconsideration for the following reasons.

Toshima disclose apparatus for processing semiconductor devices. The Toshima disclosure acknowledges that after a semiconductor substrate is etched by a chemical solution or by plasma, sufficient care must be paid to corrosion protection of the sample after the etching process; however, as may be seen from the diagrammatic planned view from FIG. 2, this apparatus is essentially apparatus 10 for etching a sample, a plasma post-processing apparatus 20, a wet-processing apparatus 30 and a dry-processing apparatus 40.

The apparatus is equipped with means 50, 60 and 70 for transferring the sample between these processing apparatuses. However, nowhere in the disclosure or drawing figures of Toshima et al. is there any reference to the use of an integrated metal etch tool interfaceable with strip, vacuum

and deionized water or rinse chamber means to remove the products of etching and neutralization.

Accordingly, Toshima fails to anticipate applicants' claims, especially as amended.

Withdrawal of the rejection is respectfully requested.

Claims 16 and 17 were rejected as being anticipated by Chen et al. under 35 U.S.C. 102(b).

Applicants respectfully traverse this rejection and request reconsideration for the following reasons:

A review of Chen et al. shows that it only disclose a vacuum chamber for passivating and stripping to inhibit corrosion of a semiconductor substrate. The chamber strips the polymeric remnant resist remaining on the substrate. This process only uses conventional processing equipment (see col. 3, lines 17-19) to passivate and strip the substrate. FIG. 2 of Chen et al. is telling in that it is the most comprehensive depiction of the vacuum chamber arrangement. Clearly, absent from this figure is any reference to or mention of an integrated metal etch tool interfaceable with vacuum chamber means and strip chamber means, such as those presently disclosed in applicants' claims as amended.

Withdrawal of the rejection is respectfully requested.

Claims 16 and 17 were rejected as being anticipated by Davis et al. under 35 U.S.C. 102(b).

Applicants respectfully traverse this rejection and request reconsideration for reasons hereinafter provided.

Davis et al. disclose apparatus for transferring work pieces such as integrating circuits. The apparatus comprises:

- (a) a vacuum carrier having a sealable carrier door and capable of maintaining a vacuum with the workpieces therein, the carrier door movable between an open and close position;
- (b) a chamber adapted to receive the carrier and selective move and carrier door and having a closeable port; the chamber capable of maintaining an applied vacuum;
- (c) a moveable arm located within the chamber and capable of engaging the workpieces, the arm moveable into the carrier and through the port to transfer the workpieces;
- (d) a transfer mechanism located exterior to the chamber and adapted to transfer the workpieces from the arm to a non-vacuum processing station; and
- (e) a control system selectively applying vacuum and ambient pressure to the chamber.

Although Davis et al. disclose a multi-chamber apparatus, this apparatus lacks chamber means to perform semiconductor structure chemistry (removal of etchant and neutralization products) to permit a final rinse step using only deionized water.

More particularly, Davis et al. clearly lacks the apparatus combination of either the vacuum and deionized rinse

chamber means interfaceable with a metal etch tool as required in claims 16-17.

Accordingly, Davis et al. fails to anticipate applicants' claims as presently amended.

Withdrawal of the rejection is respectfully requested.

Note is taken of the Office Action's statement regarding method limitations in an apparatus claim; however, it is error to regard the functions of apparatus as a method limitation, inasmuch as the 6th paragraph of 35 U.S.C. 112 permits means plus function language to be includable in a claim as a necessary condition to satisfy the "means plus function" requirements.

As mentioned in applicants' specification on page 8, lines 21-24, if the etchant and neutralization reactions do not occur in the vacuum chamber, the sidewall can trap chlorine and water species - thereby resulting in a corrosion cycle where the chlorine acts as a catalyst. In that case, reactions 4 and 5 (as shown on page 8, lines 25-28 will occur). The novel arrangement of applicants' integrated metal etch tool interfaceable with the vacuum and strip chambers in claims 16 and 17 do not permit the small time window between metal RIE and the sidewall removal which would obtain for corrosion to transpire. Further, the low reaction pressure (under 10 m Torr) enables the H₂O reaction product to escape. And, the low reaction pressure also enables easy integration of the chamber designed to carry out reactions 1-3 with the metal RIE process tool.

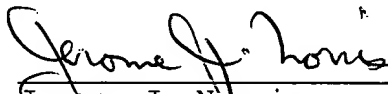
As stated in applicants' specification on page 9, the vacuum chamber maybe interfaced with the metal etch tool or left as a stand-alone chamber for introducing the reaction mixture; however, applicants have recited the most effective arrangement, which is the vacuum chamber interfaced with the metal etch tool.

Clearly, Davis et al. lacks any reference to or mention of such an arrangement.

It is a time-honored legal precedent that means claims are not proper without corollary functions associated therewith.

In view of the foregoing amendments, remarks and arguments, it is believed that the application is now in condition for allowance and early notification of the same is earnestly solicited.

Respectfully submitted,


Jerome J. Norris
Attorney for Applicants
Reg. No. 24,696

Jerome J. Norris, Esq.
LAW OFFICES OF Jerome J. Norris
1901 Pennsylvania Avenue, N.W., Suite 305
Washington, DC 20009
Telephone: (202) 737-4410
Facsimile: (202) 737-3315

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